

We claim:

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1. A monocyclopentadienyl complex comprising the structural feature of the formula $\text{Cp}-(\text{Z}-\text{A})_m\text{M}^{\text{A}}(\text{I})$, where the variables have the following meanings:

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Cp is a cyclopentadienyl system,

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A is an uncharged donor comprising at least one atom of group 15 or 16 of the Periodic Table,

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Z is a bridge between A and Cp comprising at least one atom of group 14 of the Periodic Table and at least one atom of group 15 or 16 of the Periodic Table,

M^{A} is titanium, zirconium, hafnium, vanadium, niobium, tantalum, chromium, molybdenum or tungsten or an element of group 3 of the Periodic Table and the lanthanides and

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m is 1, 2 or 3.

2. A monocyclopentadienyl complex as claimed in claim 1 which has the formula $\text{Cp}-(\text{Z}-\text{A})_m\text{M}^{\text{A}}\text{X}^{1\text{A}}_n(\text{V})$, where the variables have the following meanings:

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Cp is a cyclopentadienyl system,

A is an uncharged donor comprising at least one atom of group 15 or 16 of the Periodic Table,

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Z is a bridge between A and Cp comprising at least one atom of group 14 of the Periodic Table and at least one atom of group 15 or 16 of the Periodic Table,

M^{A} is titanium, zirconium, hafnium, vanadium, niobium, tantalum, chromium, molybdenum or tungsten or an element of group 3 of the Periodic Table and the lanthanides and

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m is 1, 2 or 3,

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X^{1A} are each, independently of one another, fluorine, chlorine, bromine, iodine, hydrogen, C_1 - C_{10} -alkyl, C_2 - C_{10} -alkenyl, C_6 - C_{20} -aryl, arylalkyl having 1-10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part, $NR^{18A}R^{19A}$, OR^{18A} , SR^{18A} , SO_3R^{18A} , $OC(O)R^{18A}$, CN, SCN, β -diketonate, CO, BF_4^- , PF_6^- or bulky noncoordinating anions or two radicals X^{1A} may form a substituted or unsubstituted diene ligand, in particular a 1,3-diene ligand, and the radicals X^{1A} may also be joined to one another,

R^{18A} - R^{18A} are each, independently of one another, hydrogen, C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl, arylalkyl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part, SiR^{20A}_3 , where the organic radicals R^{18A} - R^{19A} may also be substituted by halogens or nitrogen- and oxygen-containing groups and two radicals R^{18A} - R^{18A} may also be joined to form a five- or six-membered ring,

R^{20A} are each, independently of one another, hydrogen, C_1 - C_{20} -alkyl, C_2 - C_{20} -alkenyl, C_6 - C_{20} -aryl, arylalkyl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two radicals R^{20A} may also be joined to form a five- or six-membered ring and

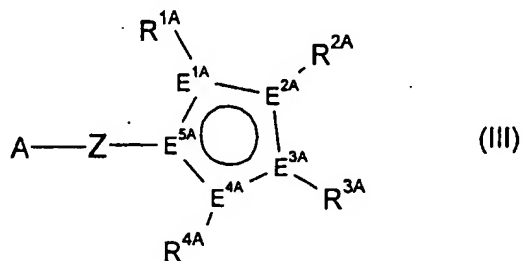
n is 1, 2 or 3.

3. A monocyclopentadienyl complex as claimed in claim 1 or 2 comprising the structural element of the formula $Cp-Z-A-M^A$ (II), where the variables have the following meanings:

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$Cp-Z-A$ is

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where the variables have the following meanings:

E^{1A} - E^{5A} are each carbon or not more than one E^{1A} to E^{5A} is phosphorus,

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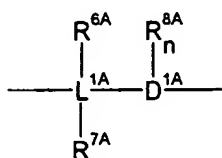
R^{1A} - R^{4A} are each, independently of one another, hydrogen, C_1 - C_{22} -alkyl, C_2 - C_{22} -alkenyl, C_6 - C_{22} -aryl, arylalkyl having from 1 to 10 carbon atoms in the alkyl part and 6-20

carbon atoms in the aryl part, $\text{NR}^{5\text{A}}_2$, $\text{N}(\text{SiR}^{5\text{A}}_3)_2$, $\text{OR}^{5\text{A}}$, $\text{OSiR}^{5\text{A}}_3$, $\text{SiR}^{5\text{A}}_3$, $\text{BR}^{5\text{A}}_2$,

where the organic radicals $\text{R}^{1\text{A}}\text{-R}^{4\text{A}}$ may also be substituted by halogens and two vicinal radicals $\text{R}^{1\text{A}}\text{-R}^{4\text{A}}$ may also be joined to form a five-, six- or seven-membered ring, and/or two vicinal radicals $\text{R}^{1\text{A}}\text{-R}^{4\text{A}}$ are joined to form a five-, six- or seven-membered heterocycle containing at least one atom from the group consisting of N, P, O and S,

the radicals $\text{R}^{5\text{A}}$ are each, independently of one another, hydrogen, $\text{C}_1\text{-C}_{20}\text{-alkyl}$, $\text{C}_2\text{-C}_{20}\text{-alkenyl}$, $\text{C}_6\text{-C}_{20}\text{-aryl}$, arylalkyl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two geminal radicals $\text{R}^{5\text{A}}$ may also be joined to form a five- or six-membered ring,

Z is a divalent bridge between A and Cp and is



where

$\text{L}^{1\text{A}}$ is carbon, silicon or germanium, in particular silicon,

$\text{D}^{1\text{A}}$ is an atom of group 15 or 16 of the Periodic Table, in particular oxygen, sulfur, nitrogen or phosphorus,

n is 0 when $\text{D}^{1\text{A}}$ is an atom of group 16 and is 1 when $\text{D}^{1\text{A}}$ is an atom of group 15,

$\text{R}^{6\text{A}}\text{-R}^{8\text{A}}$ are each, independently of one another, hydrogen, $\text{C}_1\text{-C}_{20}\text{-alkyl}$, $\text{C}_2\text{-C}_{20}\text{-alkenyl}$, $\text{C}_6\text{-C}_{20}\text{-aryl}$, arylalkyl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or $\text{SiR}^{8\text{A}}_3$, where the organic radicals $\text{R}^{6\text{A}}\text{-R}^{8\text{A}}$ may also be substituted by halogens and two geminal or vicinal radicals $\text{R}^{6\text{A}}\text{-R}^{8\text{A}}$ may also be joined to form a five- or six-membered ring and

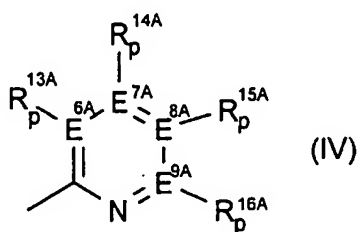
$\text{R}^{8\text{A}}$ are each, independently of one another, hydrogen, $\text{C}_1\text{-C}_{20}\text{-alkyl}$, $\text{C}_2\text{-C}_{20}\text{-alkenyl}$, $\text{C}_6\text{-C}_{20}\text{-aryl}$ or arylalkyl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part, $\text{C}_1\text{-C}_{10}\text{-alkoxy}$ or $\text{C}_6\text{-C}_{10}\text{-aryloxy}$ and two radicals $\text{R}^{8\text{A}}$ may also be joined to form a five- or six-membered ring, and

A is an uncharged donor group containing one or more atoms of group 15 and/or 16 of the Periodic Table of the Elements or a carbene, preferably an unsubstituted, substituted or fused, heteroaromatic ring system, and

5 M^A is a metal selected from the group consisting of titanium in the oxidation state 3, vanadium, chromium, molybdenum and tungsten.

4. A monocyclopentadienyl complex as claimed in any of claims 1 to 3, wherein A is a group of the formula (IV):

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, where

$E^{6A}-E^{9A}$ are each, independently of one another, carbon or nitrogen,

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$R^{13A}-R^{16A}$ are each, independently of one another, hydrogen, C_1-C_{20} -alkyl, C_2-C_{20} -alkenyl, C_6-C_{20} -aryl, arylalkyl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or SiR^{17A}_3 , where the organic radicals $R^{13A}-R^{16A}$ may also be substituted by halogens or nitrogen and further C_1-C_{20} -alkyl, C_2-C_{20} -alkenyl, C_6-C_{20} -aryl, arylalkyl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part or SiR^{17A}_3 groups and two vicinal radicals $R^{13A}-R^{16A}$ or R^{13A} and Z may also be joined to form a five- or six-membered ring and

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R^{17A} are each, independently of one another, hydrogen, C_1-C_{20} -alkyl, C_2-C_{20} -alkenyl, C_6-C_{20} -aryl or arylalkyl having from 1 to 10 carbon atoms in the alkyl part and 6-20 carbon atoms in the aryl part and two radicals R^{17A} may also be joined to form a five- or six-membered ring and

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p is 0 when $E^{6A}-E^{9A}$ is nitrogen and is 1 when $E^{6A}-E^{9A}$ is carbon.

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5. A monocyclopentadienyl complex as claimed in claim 3 or 4, wherein -Z- is $-SiR^{6A}R^{7A}-O-$.

6. A catalyst system for olefin polymerization comprising

A) at least one monocyclopentadienyl complex as claimed in any of claims 1 to 5,

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- B) optionally, an organic or inorganic support,
- C) optionally, one or more activating compounds,
- D) optionally, further catalysts suitable for olefin polymerization and
- E) optionally, one or more metal compounds containing a metal of group 1, 2 or 13 of the Periodic Table.
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7. A prepolymerized catalyst system comprising a catalyst system as claimed in claim 6 and one or more linear C₂-C₁₀-1-alkenes polymerized onto it in a mass ratio of from 1:0.1 to 1:1000 based on the catalyst system.
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8. The use of a catalyst system as claimed in claim 6 or 7 for the polymerization or copolymerization of olefins.
9. A process for preparing polyolefins by polymerization or copolymerization of olefins in the presence of a catalyst system as claimed in claim 6 or 7.
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